SECTION 07530

ELASTOMERIC SHEET ROOFING (TPO)

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Section 01354 – LEED Credit Summary.

C. Section 01355 – LEED Certification Procedures.

D. Section 01356 – LEED Submittal Forms.

E. Section 01400 – Quality Control

1.2 DESCRIPTION OF WORK

A. Provide all labor, equipment, material and services necessary for the complete installation of an elastomeric sheet membrane roof system conforming to UL and FM requirements for a Class A rated assembly, and local requirements for wind uplift resistance. Work includes, but is not limited to:

1. Roofing Membrane Materials
2. Insulation
3. Accessories

1.3 SUBMITTALS

A. Product Data: Provide characteristics on membrane materials, flashing materials, insulation, gravel stops, pavers, and insulation fasteners as required for this project.

B. Shop drawings shall include:

1. Outline of roof and size
2. Deck types
3. Roof slopes and designation of direction of slope and location and depth of tapered insulation
4. Location and type of all penetrations, existing and proposed
5. Perimeter and penetration details
6. Key plan
7. Insulation thickness and types keyed to product data submitted as of 1.3 A.
8. Fastener sample
9. Manufacturer’s standard insulation sample
10. Manufacturer’s standard membrane sample
11. Warranty type and period
12. Installer's resume
13. Manufacture’s approved pre-installation notice

C. When field conditions necessitate modifications to the originally approved shop drawings, the shop

drawings will be resubmitted for record.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with Underwriters Laboratories Inc. (UL) Class A Fire Hazard Classification, and FM Construction Bulletin 1-28, Class 1 Construction.

B. Installer's Qualifications: Installer shall have 5 years minimum experience in the installation of EPDM roofing, having completed three projects of similar size which had the warranty specified.

1.5 SUSTAINABILITY REQUIREMENTS

A. SS Credit 7.2 – Heat Island Effect – Roof: Provide roofing materials with a solar reflectance index (SRI) equal to or greater than 78 for a low sloped roof (≤ 2:12) and 29 for a steep sloped roof (> 2:12).

1. See Section 01355 for submittal requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials in original, unopened containers or wrapping with labels intact.

B. Protect materials from water, the elements, and other damage during delivery, storage, and handling.

C. Store insulation, roofing, and other materials, including materials stored on roof, on clean wood pallets or platforms and cover with waterproof covers securely fixed in place.

D. Roof loading should not begin until steel deck is erected and approved for covering. Spread out rooftop material storage to prevent excessive load on roof. Protection board, where specified, weighs 1 psf. and where bundles are broken, repackaged with waterproof coverings and spread throughout the deck structure.

E. Store materials containing solvents in tightly sealed containers. Store at proper temperatures with adequate fire and safety precautions.

1. Remove from Site wet or damaged materials, including improperly stored materials exposed to rain, snow, or other water.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply insulation or roofing materials when roof deck is wet or when frost, ice or snow present on deck.

B. Do not apply insulation or roofing materials when other adverse environmental conditions exist as defined by roofing manufacturer. Proceed with work only when conditions have been corrected to the satisfaction of roofing manufacturer representative. Notify Owner’s Representative of delays caused by such conditions.

C. Do not apply insulation or roofing materials when air temperature or temperature of deck is below that recommended by manufacturer, or when excessive humidity is or can be expected to be present within building, unless special precautions satisfactory to Owner’s Representative are taken. Submit proposed special precautions to Owner’s Representative for approval, and do not proceed without approval.

D. Do not apply insulation or roofing materials when air temperature and wind velocity results in a below 0 deg. F. "wind chill temperature" or actual temperature below 10 deg. F.. Notify Owner’s Representative of delays caused by such conditions.

1.7 WARRANTY AND MAINTENANCE RECOMMENDATIONS

A. Roofing Contractor shall submit pre-installation notification and required project documentation and information to membrane manufacturer, in accordance with manufacturer's requirements for issuance of warranty.

B. Original warranty turned over by Roofing Contractor to Owner's Representative.

C. Roofing Contractor, upon substantial completion, shall submit the notice of inspection to the membrane manufacturer's on site project representative.

D. Roofing Contractor to fax a copy manufacturer's inspection punch lists to: Owner's Representative and Architect.

E. Upon completion of manufacturer's punch lists, Roofing Contractor fax statement that manufacturer's punch lists are complete to: Owner's Representative and Architect.

1.8 WARRANTY

Provide Roof System Manufacturer's standard 15-year warranty under provisions of Section 01001 including coverage of materials and installation and resulting damage to building resulting from failure to resist penetration of moisture. Warranty shall be non pro-rated and cover replacement cost for the full term of the warranty. Warranty shall not include deductibles and shall include coverage to repair cuts and punctures caused by rooftop service and maintenance activities.

PART 2 PRODUCTS

2.1 MEMBRANE MATERIALS

A. Acceptable Manufacturers: Only the following pre-approved roofing manufacturers listed below will be accepted . Contractor shall select only one manufacturer for this Project:

1. Firestone: TPO.
2. Johns Manville: TPO
3. Stevens: TPO.
4. GAF Everguard TPO

B. Reinforced thermoplastic polyolefin (**TPO**), minimum 45 mils (.045") thickness, 15 mil minimum thickness of top layer over scrim as tested in accordance with ASTMD751, white exposed face color, hot air welding seaming system.

C. Flashing: Provide 60 mil sheet flashing and prefabricated flashing components as recommended by membrane manufacturer.

2.2 INSULATION MATERIALS

A. Manufacturers:

1. Firestone Building Products Co.
2. Hunter Insulation Systems
3. Or approved equal.

B. Polyiso Board Roof Insulation: Rigid thermal insulation with polyisocyanurate closed-cell foam core with manufacturer's standard facing laminated to both sides; complying with ASTM 1289-02, and an LTTR R-value of 20. Provide tapered insulation per slopes noted on drawings and as required to allow for positive drainage.

2.3 ACCESSORIES

A. Attachment Systems: Meet manufacturer's requirements for:

1. Field.
2. Perimeter.
3. Perimeter Wall.
4. Wall Cap.

All penetrations and flashings, inclusive of mechanical fixing systems and components and all bonding adhesives and seam sealants.

B. Plates and Screws for insulation and membrane, FMGlobal approved: Plates for insulation, screws for insulation (#12 or larger), corrosion-resistant, self tapping, self drilling, coated screws with low profile head. Screws for membrane, membrane seams and membrane accessories (#15 or larger), corrosion-resistant, self tapping, self drilling, coated screws, with low profile head.

1. Manufacturers:

a. ITW Buildex.
b. Olympic.
c. SFS.
d. Tru-Fast.

Or may be single-source through the membrane manufacturer as a complete roofing system.

C. Membrane Protective Covering: Material recommended by manufacturer to protect roofing system from corrosive exhaust residue where required.

D. Pipe Seals and Flashing Boots: Use preformed components when furnished by roofing manufacturer, and stainless steel clamps.

E. Sealants, caulks, backer rods and materials for fixing flashings into crevices, reglets, or expansion joints. As required and recommended by roofing manufacturer.

F. Roof Protection Pad/Equipment Walkway Pad: of single ply rubber/thermoplastic membrane protection pad that is supplied by selected membrane manufacturer as integral to the manufacturer's roofing system warranty.

G. Protection Board: 1/2 inch thick, non-combustible, glass fiber faced gypsum panels with water resistant treated gypsum core. G-P Gypsum Corporation: Dens-Deck or approved equal.

H. Gas Pipe Support Pads: Manufacturer's roofing membrane material and standard details. Where required by codes due to seismic requirements or high wind conditions, provide curb mounted pipe supports as approved by Architect.

I. TPO coated metal and/or field painted galvanized metal per Section 07620 for:

1. Fabricate metal work for:

a. Flashings.
b. Counterflashings.
c. Cleats.
d. Scupper flashings
e. Gutter and downspout systems.
f. Flat sheets.

And other roofing related flashings.

J. Expansion joint flashing materials, either prefabricated or field-fabricated.

K. Membrane cleaners: as required and recommended by roofing manufacturer.

L. All separator films and all metal tapes or fabric-based tapes: As required and recommended by roofing manufacturer.

M. Other Materials: As required and recommended by roofing manufacturer.

N. Foam Sealant: Non-CFC, polyurethane foam.

1. Acceptable manufacturers:

a. Geocel Corporation, Elkhart, IN, 1-part "Geocel Expanding Foam Sealant", 800-348-7615.
b. Insta-Foam Products Inc., Joliet, IL, 1-part "Insta-Seal" or 2-part "Roof-Pak", 800-800-3626.
c. Or equivalent with same performance and warranty. Sub-contractor takes responsibility for product.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work; deck is clean and smooth, free of snow or ice; properly sloped to drains.

B. Verify roof openings, curbs, and protrusions through roof are solidly set; cant strips and reglets are in place.

C. Verify adjacent masonry wall members are secure and stable. Verify grout keys are filled flush, cracks are filled.

3.2 PREPARATION

A. Fill concrete surface honeycomb and variations with latex filler.

3.3 INSULATION APPLICATION

A. Extend insulation full thickness as a single layer over entire surface to be insulated, cutting and fitting tightly around obstructions. Form cant strips, crickets, saddles and tapered areas with additional material as shown and as required for proper drainage of membrane.

B. Do not install more insulation each day than can be covered with membrane before end of day and before start of inclement weather.

C. All insulation boards shall be butted together with no gaps greater than 1/4 inch. Gaps greater than 1/4 inch shall be filled with the same material.

D. Install insulation in two layers; stagger joints as required to ensure joints do not extend from roofing surface to metal deck.

3.4 MEMBRANE APPLICATION

A. Mechanically fastened reinforced single ply membrane roofing systems:

1. PVC/TPO Roofing Systems: Polyester-reinforced thermoplastic (PVC) membrane roofing system. Conform to UL Class A, and FMGLOBAL 1-90 requirements. Provide all components to the roofing system including but not limited to the following:

B. Roofing manufacturer’s standard technical details for installation and installation instructions shall be followed.

1. Exceptions to details in Manufacturer’s Technical Manual or Drawings must be approved in writing by the manufacturer, with a copy of the manufacturer's approved deviation faxed to Owner’s Representative, five working days prior to installation of the approved deviation. Roofing contractor may not install the proposed deviation until it is approved by means of a faxed approval from Owner’s Representative.

C. Roofing system and details shall conform to local code requirement where local code requirement is more stringent in wind uplift resistance than the manufacturer's warranty requirements.

D. Perform work to meet applicable requirements of membrane manufacturer’s current technical manual.

E. Install work to meet requirements of Owner’s insurance agency and regulatory agencies.

F. Field membrane to be installed perpendicular to the line of the deck flutes. All fasteners MUST penetrate top of flute only.

G. Roofing contractor shall follow membrane manufacturer's requirements and FMGLOBAL 1-90 classification for attachment of roof membrane at:

1. Perimeter.
2. Roof corners.
3. Field of the roof.

H. Perimeter Attachment of the Deck Membrane: Turn up deck membrane minimum 3 inches at the parapet and secure using a rigid termination bar installed on the parapet wall tight to the intersecting

deck, and fastened at ends and 6" o.c. Trim membrane and leave a minimum of 1/2 inch above the line of the termination bar. In addition, apply a continuous, unbroken line of sealant between the membrane and the parapet wall at the intersection with the deck.

I. Membrane Installation Tolerances:

1. Minimum overlap of membrane seams shall be 6 inches.
2. 1/2 inch gap between the edge of the membrane and the outer diameter of the seam plate.
3. 1/2 inch gap minimum between the hot air weld zone and the edge of the seam plate

J. Seam Welding:

1. Hot Air Welding: Seam welding with hot air tools, both manual and automatic, are an allowed method for closing the roofing membrane system, membrane flashing and walkway/protection pads. Follow the Roofing Membrane Manufacturer's instructions for hot air welding.

K. Testing and Patching of seams.

1. Probe 100 percent of welds for continuity and integrity.
2. Patch blisters located within 1/2 inch of weld edge.
3. Patch carbon burns or "hot" residue deposits along welds.
4. Patch membrane surfaces scorched from excessive heat during welding.
5. Patch seam voids that allow the tip of a probe to enter the weld.
6. Patch field membrane wrinkles that run continuously into and through a seam.
7. Patch wrinkles created in the welding process that run into the weld edge.

L. Patching: Minimum patch size on the flat field: 4 inches by 4 inches with rounded corners.

3.5 FLASHINGS AND ACCESSORIES

A. General: Install flashings and accessory items as shown as required by the Roofing Manufacturer and in accordance with the Drawings and Specifications.

B. Curb Flashings: Fully adhere curb flashings with Membrane Manufacturer's bonding adhesive for thermoplastic systems. At HVAC unit curbs, wrap membrane over top of curb before setting HVAC unit.

C. Flashing Attachments:

1. 26 gauge (or thicker) metal to masonry caps at 9" o.c. for lead anchors and/or concrete screws.
2. Attachment of metal cap coping into lumber plate at 6" o.c. with No 14 or thicker screw.
3. Nails of any type or size are not acceptable in any detail on this project.

D. Torch-applied membranes or equipment for torch-application are **NOT** allowed on this Project.

E. Attachment of membrane to masonry walls: No exposed fastener heads on a completed roofing system.

F. Parapet Wall Flashing: Verify from manufacturer's project representative that parapet wall surface to receive flashing meets manufacturer's approval. (If parapet wall surface does not comply, provide Manufacturer's recommended substrate). Mechanically attach roof membrane to parapet walls with termination bars installed horizontally in equal spaces not exceeding 24 inches vertically.

1. Fasten the termination bar with lead anchors and 12 inches o.c. Sealant between the membrane and parapet wall is not required for intermediate termination bars. Termination bars that intersect a wall expansion joint are to be cut on each side of the expansion joint and the end of the bar on each side of the joint shall be secured with a fastener. For intermediate termination bar to wall flashings over plywood, either attach termination bar with #15 screws mounted 6 inches on center, or fully adhere membrane to plywood, (glue both surfaces prior to mating), provided the outside air temperature is greater than 49 degrees F.

2. Cover over termination bar either by centering an 8 inch strip of membrane over termination bar and fully welding both edges of the strip, or by covering termination bar with the next height of flashing and welding the lower edge of the flashing 3 inches below the length of the bar. Do not reverse-flip the upper flashing over the termination bar.

3. At the base of the parapet wall, the outside edge of the base weld is not to extend more than 4 inches away from the crotch of the wall. If the weld of the base flashing exceeds 4 inches, excess billowing of the wall flashing may occur and the roofing contractor shall be required to install an additional termination bar (fixed 12" o.c and stripped-over), six inches above the crotch to correct the error.

4. When trimming wall flashing behind the termination bar, leave 1/2 inches of membrane height above the termination bar.

5. Do not expose anchors or fasteners in the intermediate wall termination detail.

G. Fabricate thermoplastic coated metal coping according to the approved Drawings.

1. Bend the vertical surface of the metal coping greater than 90 degrees so that, when installed, the vertical face is spring-loaded against the wall allowing minimal gap. Fabricate vertical edge with 1/4 inch drip flair and hemmed edge.

2. If the vertical face of the metal coping is greater than 3 inches provide a continuous 24 gauge galvanized metal keeper fastened to the wall at 12 inches on center if wood and 18 inches on center if masonry. Fabricate the vertical surface of the metal coping to interlock with the keeper and creating a drip flair.

H. Install sealant continuous, without gaps between the vertical face of the metal coping and the parapet wall.

I. At the corners of the roof where two perimeter zones intersect, overlap the perimeter roll installations to achieve a 50% increase in the number of screws for attachment of corners over the attachment of the perimeter.

J. Fasten thermoplastic coated metal used for copings on parapet wall with masonry fasteners, at 9 inches on center, into concrete or masonry, or galvanized flat head screws, fixed 6 inches on center, into wood plate. Fasteners should be straight in line, two inches from the exterior metal edge.

1. Allow 3/8 inches gap between the lengths of the cap metal for expansion.
2. Apply a two inch wide strip of duct or metal tape centered over the gap on the top horizontal surface. Do not tape vertical surface.
3. Weld 4 inch wide strip of un-reinforced thermoplastic membrane centered over the joint, both vertical and horizontal surfaces.
4. Install un-reinforced flashing membrane at inside and outside corners of PVC/TPO coated metal, allowing a minimum of ½ inch of weld onto vertical face.

K. Terminate membrane flashing over top of parapet within 1/2 inch of outer metal coping break edge. Fully adhere membrane with bonding adhesive to exposed top of masonry or concrete and down a minimum of 6 inches on the vertical surface. Fully hot air weld a minimum 1-1/2 inch bond to thermoplastic coated metal coping.

L. Installation of Parapet Corners: On parapets of 10 inches and higher, install nominal 6 inch x 6 inch galvanized steel or PVC/TPO coated sheetmetal angle at interior parapet corners from roof deck to top of parapet. Lap roof membrane over sheetmetal angle and fully heat weld edges. Hold back intermediate and base termination bars 7 inches from inside corner of parapet.

M. Pipe Seals and Flashing Boots: Install prefabricated boots on all pipes that are sized to receive boots. Do not use un-reinforced membrane unless the size of the pipe is not supplied.

1. Wrap black asphalt impregnated iron pipe with metal tape aligned with the top of the boot prior to booting.
2. Embed sealant between tape and pipe and between the boot and top of tape. Smooth out sealant after installing and tightening hose clamp.

N. Furnish laminated metal, plastic, or other flashings as required. Install according to roofing manufacturer's instructions.

O. Adhesives, Solvents and Sealants: Install according to roofing manufacturer's requirements.

P. Roof Protection Pad/Equipment Walkway Pad: Install walkway pads, minimum 39” wide - maximum 48” wide x manufacturer’s standard length, not more than 2 inches from curbs and not more than 3/8 inches between pads, continuously around HVAC units, motorized exhaust fans (PRVs), condensing unit platforms, and refrigeration units. Loose lay protection board over roof membrane on three sides of roof hatch. Cover protection board with protection pad.

Q. Fully adhere the entire perimeter edges to prevent water migrating under pads per Roofing Manufacturer’s recommended method.

R. Gas Pipe Support Pads: Place loose layer of roofing membrane under bottom of treated wood block, turn up both sides and fasten to block with coated roofing screws and seam plates.

END OF SECTION